

The Effects of Mindfulness on Death-Thought Accessibility Immediately Following a Mortality  
Salience Induction

A Senior Honors Thesis

Presented in Partial Fulfillment of the Requirements for graduation with distinction in  
Psychology in the undergraduate colleges of The Ohio State University

by

Scott Adams

The Ohio State University  
March 2007

Project Advisors: Professor Robert Arkin, Department of Psychology  
Dr. Aaron Wichman, Department of Psychology

### ACKNOWLEDGMENTS

I would like to thank Drs. Robert Arkin and Aaron Wichman for their generosity in providing me with their resources, time, inspiration, and support. I would also like to thank Drs. Janet Fink and Thomas Nygren for participating in my defense. I extend appreciation to Peter and Shelley Adams, David Givler, and Lynn Markle, who provided mature wisdom beyond my years. Finally, I thank Hannah Givler, whose selfless support gave me the confidence to do what needed to be done. This thesis was made possible with the approval of the Ohio State University IRB Committee (IRB Protocol 2006B0261).

### ABSTRACT

Two studies explored the effects of mindfulness on mortality salience (MS) effects. Study 1 (154 college students) induced mindfulness or relaxation followed by a MS or control induction. A 2 x 2 ANOVA revealed an interaction effect ( $p = .05$ ) such that mindfulness increased death thought accessibility. Study 2 (57 college students) examined self-regulatory depletion--a possible confound for Study 1. A regression analysis revealed no significant difference ( $p > .05$ ) between the mindfulness and relaxation inductions on self-regulatory depletion, thus supporting the conclusion of Study 1. The present research supports the hypothesis that trained mindfulness decreases effects of MS.

Since the terror attacks of September 11, 2001, a number of psychologists have begun to focus their theoretical and research attention on a concept known as Terror Management Theory (TMT). TMT posits that a wide range of behaviors and phenomena, as diverse as materialism and male sexual attitudes (e.g. aggression and derogation towards sexually appealing women; Landau, Goldenberg, Greenberg, Gillath et al. 2006), are influenced by awareness of mortality. Of particular interest to TMT theorists is the concept of mortality salience (MS).

### Mortality Salience

When thoughts of death enter awareness, research indicates that people often alter their behavior in order to defend against the resultant anxiety and stress (Arndt, Greenberg, Pyszczynski & Solomon, 1997). These behavioral changes often have negative consequences. For example, when primed with death, individuals become more materialistic, even at the expense of environmental degradation and a decrease in personal health (Kasser & Sheldon, 2000, Study 2; Routledge, Arndt, & Goldenberg, 2004). Following a mortality salience (MS) induction, participants reported an increased importance of acquiring money and obtaining material goods (Kasser & Sheldon, 2000).

However, materialism is not the ideal means to assuage existential fear, or boost or maintain well-being in the face of existential threat. Past research shows a negative correlation between materialism and well-being suggesting that materialism may do more harm than good in managing death anxiety (Burroughs & Rindfleisch, 2002; Chang & Arkin, 2002). Participants primed with death also show significant increases in worldview defense (Arndt et al., 1997). For example, if a participant considers himself or herself to be patriotic towards America, then after a death prime, he or she would be more likely to make statements in defense of America and its

values (Arndt et al., 1997). Along the same lines, a similar effect could be observed with someone who identifies with the cultural worldviews of Christianity or Islam. Such increased defenses may result in a shutting out of alternative viewpoints and possible aggression towards those who hold alternative worldviews. Indeed, Pyszczynski and Greenberg (2002) have identified just this tendency as a consequence of MS. In this thesis I explore mortality salience and how some of its effects can be alleviated.

Arndt, Greenberg, Solomon, Pyszczynski, and Simon (1997) have shown that participants suppress death-thoughts immediately following an MS induction. This initial suppression is followed by an increase in death thought accessibility, as measured by implicit accessibility measures. Although death thoughts increase after an initial suppression period, there is no evidence that participants are aware of this increase. The many consequences of MS appear to be driven by a process outside of conscious awareness. Previous research shows that the suppression process is moderated by self-esteem, suggesting that self-esteem or self-defense concerns play an important role in the process (Pyszczynski, Greenberg, Solomon, Arndt, & Schimel, 2004). Although there exist various means of bolstering self-worth in the face of threat (e.g. Fein & Spencer, 1997), I have focused on mindfulness as a means of reducing reactivity to death thoughts. After a mindfulness induction, I expected that participants would no longer as actively suppress threatening death thoughts, instead accepting them in a non-defensive way. This acceptance should be shown as a decreased death thought suppression immediately following MS.

## Mindfulness

Traditionally, mindfulness appears in Buddhist teachings as the psychological result of regular meditation. It has been described as the psychological state of being aware of and attentive to the present moment, in contrast to ruminating about the past or the future (Brown & Ryan, 2003). Typically, in following with mindfulness' Buddhist roots, mindfulness is cultivated via forms of cognitive exercise that develop one's ability to sustain and direct one's focus for an extended period of time (e.g. by the control and awareness of breathing patterns). This activity trains the mind to retain its focus on one concept, rather than drifting aimlessly. Untrained mindfulness also exists and varies greatly from person to person, depending on numerous variables (Brown & Ryan, 2003). Research has suggested that individuals who possess high levels of mindfulness display a number of resultant psychological and physical benefits. In general, research suggests that mindfulness increases overall well-being (Brown & Ryan, 2003; Carson, 2003; Wall, 2005).

Of particular interest to this proposed research are the studies of mindfulness in the cancer patient population. This interest stems from the fact that cancer patients are most certainly aware of their mortality, and mindfulness has shown to affect their ability to cope with mortality salience. Multiple studies have shown that cancer patients benefit from increased mindfulness in several ways, including improved sleep quality and mood; lowered fatigue and stress levels (Carlson & Garland, 2005; Carlson, Speca, Patel & Goodey, 2004; Tacon, Caldera & Ronaghan, 2004). It seems reasonable to assume that the stress and related psychological changes that accompany a cancer diagnosis result, at least in part, from the patient's experience of an increase in MS due to the often deadly consequences of cancer. Because mindfulness has been shown to reduce the negative effects of MS-based anxiety in those individuals, it follows

that mindfulness may also affect how research participants will react to experimentally induced MS. Study 1 provided a direct test.

Study 1 experimentally induced either a state of mindfulness or relaxation in participants to compare the effects of these states on death thought accessibility resulting from an MS induction. Arndt et al. (1997) has demonstrated that suppression of death thoughts occurs immediately following an MS induction as a cognitive defense strategy against death anxiety. Therefore, measuring death thought accessibility is an acceptable method to compare levels of death anxiety between groups. Because mindfulness exercises are modeled after meditation exercises, they often lead to not only mindfulness, but also a state of physical relaxation (i.e. parasympathetic PNS activation). In an attempt to rule out the possibility that parasympathetic PNS activation alone could account for the effects of mindfulness on death-thought accessibility, a relaxation exercise was employed as a control condition in Study 1 and Study 2, in order to compare a state of simple parasympathetic activation with a state of mindfulness. In addition to the mindfulness control condition, a MS control condition was used. This MS control was based on instructions to imagine a painful but non-fatal dental procedure. These instructions are commonly used in the terror management literature to provide a control condition that controls for general anxiety. By using this anxiety provoking control condition, it is possible to determine whether the effects of MS are due explicitly to death anxiety, and not some other type of anxiety. Both studies utilized this MS control condition, hereafter referred to as the dental pain salience (PS) condition.

Study 2 was designed to test an alternative hypothesis made evident by recent work involving the depletion of self-control. The act of self-control plays a role in many important daily functions including, but not limited to, acts of restriction and self-denial, higher-level

cognitive processes such as logical deduction and analysis, and engaging in extended periods of focus and attention. Research has also demonstrated that self-control relies on limited cognitive resources, thus leaving it susceptible to temporary losses in efficiency following extended usage (Schmeichel, 2006). Further, all of the functions carried out by the self-control mechanism are dependent upon the same resource, resulting in a global loss of self-control efficiency, even when only one specific type of self-control (e.g. self-denial) is performed. For example, Muraven, Tice and Baumeister (1998) found that participants who were asked to suppress thoughts about a white bear would later exert significantly less persistence at an unsolvable anagram task (when compared to a group who were asked to think about, rather than suppress thoughts about, a white bear). In other words, the conscious suppression of thoughts led to a depletion of the self-control strength necessary to persist at a difficult task. The relationship of self-control depletion to mortality salience and death-thought suppression also has recently been demonstrated in a laboratory setting. For instance, Gailliot, Schmeichel, and Baumeister (2006) have found that self-control depletion leads to immediate increases in death thought accessibility.

Because increased mindfulness also was predicted to increase death-thought accessibility, Study 2 investigated the possibility that the mindfulness and relaxation exercises might differ in their depletion of self-control resources. A finding that the mindfulness induction used in Study 1 was more self-control depleting than the relaxation induction would call into question the meaning of Study 1's predicted findings as being uniquely caused by mindfulness.



## STUDY 1

*Method*

Participants were 154 (52 males, 102 females) students enrolled in an introductory psychology course at the Ohio State University. Ten participants' results were excluded from analyses due to significant interruptions during the mindfulness or relaxation phase of the study. Because strong religious beliefs may alter defensive reactions to MS (due to their death-anxiety reducing effects; see Harding, Flannelly, Weaver, & Costa, 2005), 13 additional participants' results were excluded due to their multiple mentions of beliefs in life after death or reincarnation during the mortality salience induction questions. These exclusions left 131 participants remaining (47 males, 84 females). Participants were recruited through a voluntary program designed to provide introductory psychology students with an opportunity to gain first-hand knowledge regarding psychology experimentation via their participation in studies. Partial course credit was given in return for participation. All participants were reminded both verbally and on paper of the voluntary nature of the study and consented to participate. All participants were randomly assigned to conditions.

*Instrumentation & Measurement*

*Mindfulness and Relaxation Exercises.* A 5-minute, 3-part exercise adapted from dialectical behavior therapy (Baer & Krietmeyer, 2006) was used to induce mindfulness, while a similar exercise was used to induce relaxation. The mindfulness exercise instructions asked participants to focus on their breathing, to pay attention to bodily sensations, and to equally accept good and bad thoughts with as little judgment as possible. Like the mindfulness exercise, the relaxation exercise instructions also requested that participants focus on their breathing, but it did not

suggest a non-judgmental acceptance of good and bad thoughts. Rather, it suggested that participants imagine the breath flowing into and out of different parts of the body, in sequence, starting with the toes and moving upwards (See Appendix A).

*Mortality Salience (MS) and Dental Pain Inductions.* After completing either the mindfulness or relaxation exercise, participants responded to a set of two questions intended to elicit either MS or PS, as in Greenberg, Pyszczynski, Solomon, Simon, and Breus (1994). The MS induction questions were, “Please briefly describe the emotions that the thought of your own death arouses in you,” and, “Jot down, as specifically as you can, what you think will happen to you as you die and once you are physically dead.” The control condition utilized a similar question format but replaced death with a painful dental operation to control for the possibility of effects being generated by general negative thought activation rather than death-specific thought activation (See Appendix B).

*Word Completion Task.* Past mortality salience research (Arndt, Greenberg, Solomon, Pyszczynski, & Simon, 1997; Greenberg et al. 1994; Harmon-Jones, Simon, Greenberg, Pyszczynski, Solomon & McGregor, 1997) has found that an individual’s level of death-thought accessibility can be measured via a word completion task. A list of 20 word fragments (e.g. HEA\_\_\_, GRA\_\_E) was given to participants to complete. Nine of those fragments could be completed with death related or non-death related words (e.g. GRA\_\_E as GRAVE or GRAPE, COFF\_\_\_ as COFFIN or COFFEE). The nine possible death-related words were: *buried, coffin, dead, grave, hell, killed, murder, skull* and *stiff*. To score death thought accessibility, each participant’s number of death word completions was summed. The average number of death-related word completions per group represents that group’s average level of death-thought accessibility (See Appendix C).

*Mindfulness Questionnaire (MQ)*. Participants completed a 5-point Likert-type scale designed to measure levels of mindfulness. The scale was adapted from Baer, Smith, Hopkins, Krietemeyer and Toney's (2006) multiple-factor analysis of a combination of five previously developed mindfulness scales. Of the original 112 items tested, they found that five prominent factors existed (*Non-Reactivity to Inner Experience*; *Observing Thoughts/Perceptions/Feelings*; *Acting with Awareness*; *Describing/Labeling with Words*; and *Non-judging of Experience*), with a total of 64 items meeting their inclusion criteria (Baer et al., 2006). Due to time constraints, the scale used in the present study was a shortened form of the original, designed to include the four items that received the highest factor loading values from each factor, resulting in 20 items (See Appendix D).

*Additional Measures.* Because trait mindfulness has shown to correlate with a number of other constructs, (e.g. self-esteem, well-being, self-compassion, emotion regulation, experiential avoidance, and neuroticism; Baer et al., 2006), and mortality salience effects are associated with other constructs as well (e.g. self-esteem; Harmon-Jones, et al., 1997), we included other measurement instruments to check for alternative explanations of effects. The PANAS (Watson, Clark, & Tellegen, 1988), Rosenberg Self-Esteem scale (RSE; see Rosenberg, 1989; Appendix E), and Beck Depression Inventory (BDI; see Beck, Ward, & Mendelson, 1961; Appendix F) were included for this purpose.

### *Design*

A 2 X 2 (mortality- vs. pain salience X mindfulness- vs. relaxation exercise) design was used for this study. Each participant was randomly assigned to one of the four groups. The salience variable was defined by which two salience questions the participant received in his or

her packet—the mortality salience condition posed questions dealing with thoughts regarding death while the dental pain condition’s questions dealt with a painful dental operation. The Exercise variable was defined by the participants’ receipt of instructions detailing either the mindfulness exercise or the relaxation exercise.

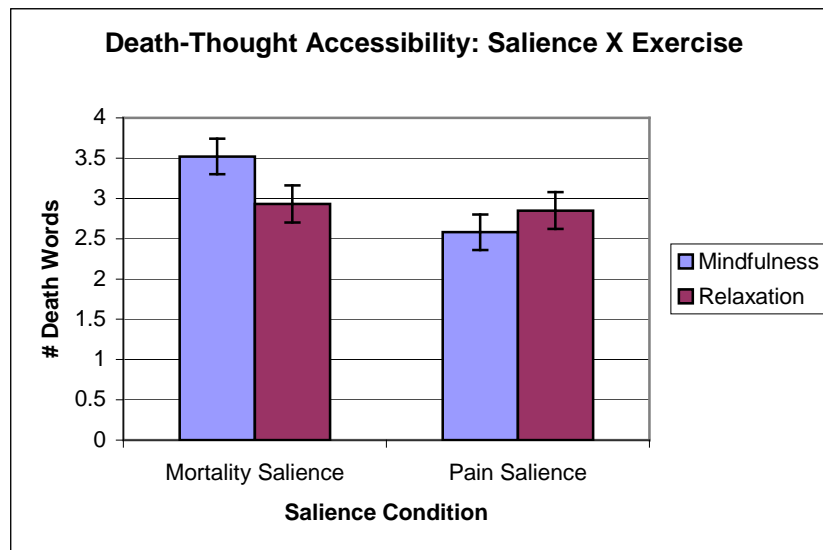
### *Procedure*

Participants were led into a classroom containing tables and chairs. Once they were seated, they were each randomly given one of four packets containing all experimental materials. They were then provided with a brief oral overview of the timing for the mindfulness or relaxation exercises but were under the impression that all packets contained relaxation exercises—mindfulness was not mentioned. The experimenter then told them to begin, and kept time with a stopwatch. After 100 seconds, participants were told to begin the second segment of the exercise, which was listed on the next page of their packets. The third segment also was completed in this fashion, following a 100 second delay to allow for completion of the second segment. When all three segments were completed, participants were told to continue through the rest of the materials at their own pace and return them to the experimenter upon completion. The mindfulness or relaxation exercise was followed immediately by either the mortality- or pain-salience induction. The word-completion task used to assess levels of death-thought accessibility was completed next, followed by the PANAS, BDI, RSE, and the mindfulness questionnaire. As participants handed in their materials, they were provided with a written debriefing and the contact information of the experimenter.

## Results

A 2 X 2 (Salience (mortality/pain) vs. Exercise (mindfulness/relaxation)) ANOVA revealed no main effect of Exercise or Salience ( $p > .05$ ) on death-thought accessibility, but revealed the expected interaction effect ( $F(1, 127) = 3.9, p = .05$ ) on death-thought accessibility (as shown in Figure 1) was noted. However, the Mortality-Mindfulness group exhibited a significantly higher death-thought accessibility score compared to the Mortality-Relaxation group. There were no effects of Exercise or Salience on any of the additional measures (the PANAS, BDI, RSE, or mindfulness questionnaire).

Figure 1.



## Study 1 Discussion

As predicted, mindfulness (compared to relaxation) significantly increased death-thought accessibility in participants who were exposed to an MS induction. In the pain salience condition, both exercise groups reported a similar level of death-thought accessibility,

A lack of effects on PANAS, BDI, and RSE scales suggest that such a short-term state of mindfulness is not sufficient to induce changes in affect, depression or self-esteem, despite research which has suggested that longer-term mindfulness practices do lead to such changes (Baer et al. 2006, Brown & Ryan, 2003; Carson, 2003; Wall, 2005). In addition, a lack of significant effect between groups on the PANAS suggests that the greater death-thought accessibility of the mindfulness group did not lead to an increase in negative affect. In regards to the mindfulness questionnaire, the provided instructions did not imply any particular temporal window from which to reference one's responses, suggesting that the mindfulness group's lack of a higher mindfulness score (compared to the relaxation group) may be due to the scale not explicitly requesting state-level responses. The results of Study 1 support the present hypothesis that state mindfulness reduces death-thought suppression without increasing negative affect.

## STUDY 2

Galliot, Schmeichel, and Baumeister (2006) have demonstrated that depletion of self-control reduces one's ability to suppress death-thoughts. Because self-control is depleted as a consequence of engaging in any type of self-regulatory behavior, we tested whether participation in the mindfulness exercise would deplete self-control. Study 2 sought to compare the self-control depletion effects of the mindfulness and relaxation exercises to explore the possibility that the death-thought suppression effects found in Study 1 were the result of depleted self-control rather than increased mindfulness.

## *Method*

Participants were 57 (19 males, 38 females) students enrolled in an introductory psychology course at the Ohio State University. They were recruited using procedures identical to Study 1.

### *Instrumentation & Measurement*

*Mindfulness and Relaxation Exercises.* The same 5-minute, 3-part mindfulness and relaxation exercises used in Study 1 were implemented again in Study 2.

*Self-Control Depletion Task.* A one-page excerpt from a graduate statistics textbook was chosen as a material source. Participants were given five minutes to circle every instance of the letter “e” that could be found in the excerpt. Then, to deplete self-control, participants were asked to again scan the same excerpt, but to circle only instances of the letter “e” that were not the first, third, or last letter of a word, and that were not followed immediately by another vowel. A clean copy of the same excerpt was provided for this second five-minute portion of the exercise. The numbers of hits (correct letter circling) for each person were calculated and used as a measure of self-control depletion.

*Mindfulness Questionnaire (MQ).* Participants completed the same mindfulness questionnaire developed for use during Study 1.

*Additional Measures.* As in Study 1, the PANAS, RSE, and BDI were issued to participants to check for possible differences between the mindfulness and relaxation groups.

### *Design and Procedure*

Participants were randomly divided into two groups: the mindfulness group and the relaxation group. Following completion of their respective exercises, each group was

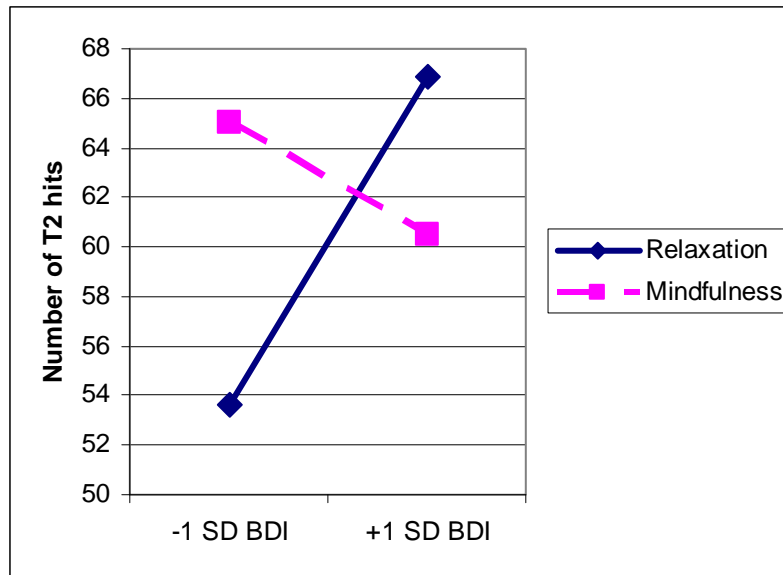
administered the self-control measurement task (letter circling). Upon completion of the task, participants completed the PANAS, BDI, and RSE. Participants returned the completed experimental materials to the experimenter, at which time they were provided with a written debriefing and contact information for the experimenter.

## Results

A regression analysis using condition, standardized BDI, and controlling for standardized T1 hits indicated no effects of condition ( $B = -.15$ ,  $SE = 3.7$ ,  $t = -0.6$ ,  $p = .53$ ) on the hits measured from the second administration of the statistics excerpt (the measure of self-control depletion). However, condition interacted with BDI ( $B = .73$ ,  $SE = 3.8$ ,  $t = 3.1$ ,  $p = .005$ ) such that in the relaxation condition, higher BDI scores predicted greater number of hits. A simple slopes test (c.f. Akin & West, 1991) of the BDI effect in the mindful condition showed that BDI was not significantly associated with number of T2 hits in this condition ( $p = .38$ ). However, in the relaxation condition, BDI was significantly associated with T2 hits ( $B = 6.6$ ,  $SE = 2.9$ ,  $p = .03$ ). Figure 2 shows a graph of predicted means based on the regression coefficients for this interaction, plotted at  $\pm 1$  SD on BDI (Aiken & West, 1991).

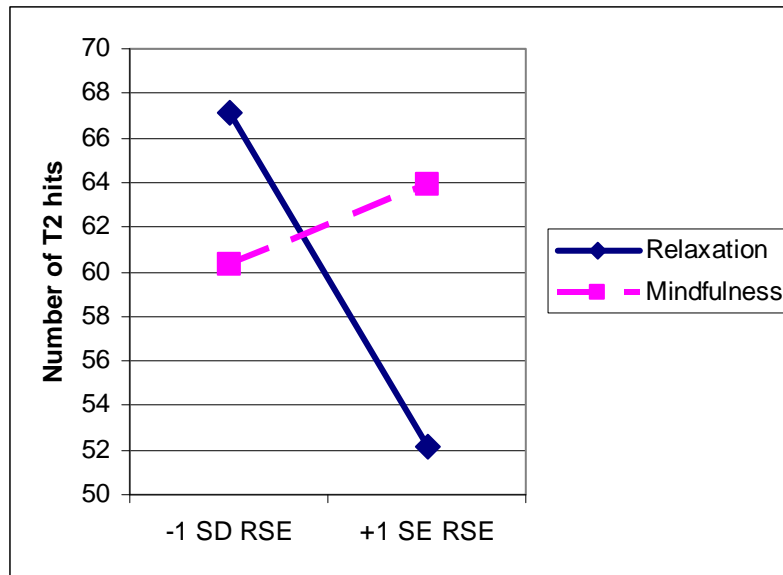


Figure 2.



A subsequent regression analysis using condition, standardized RSE scores, and controlling for standardized T1 hits indicated no effects of condition ( $B = -2.5$ ,  $SE = 3.7$ ,  $t = -0.7$ ,  $p = .51$ ) on the hits measured from the second administration of the statistics excerpt (the measure of self-control depletion). However, condition interacted with RSE ( $B = -9.28$ ,  $SE = 3.8$ ,  $t = 2.4$ ,  $p = .01$ ) such that in the relaxation condition, higher RSE scores predicted greater number of hits. A simple slopes test (Akin & West, 1991) of the RSE effect in the mindful condition showed that BDI was not significantly associated with number of T2 hits in this condition ( $p = .46$ ). However, in the relaxation condition, RSE was significantly associated with T2 hits ( $B = -7.5$ ,  $SE = 2.9$ ,  $p = .02$ ). Figure 3 shows a graph of predicted means based on the regression coefficients for this interaction, plotted at  $\pm 1$  SD on RSE (Aiken & West, 1991).

Figure 3.



### Discussion of Study 2

Because no significant difference was shown to exist between the two exercise groups on self-control depletion, it is unlikely that the effects of Study 1 were due to self-control depletion after completion of the mindfulness exercise. The mindfulness manipulation was not without effect on the self-control measure, however. The effects of BDI and RSE scores on the relaxation group's performance on the self-control task validate the claim that the mindfulness exercise indeed creates a state of mindfulness.

Mindfulness has been broken down into five distinct factors (Baer et al. 2006). In particular, the factors *Non-reactivity to inner experience* and *Acting with awareness* support the claim that the mindfulness exercise used in the present research does indeed induce mindfulness. If the mindfulness exercise utilized in Studies 1 and 2 does increase mindfulness, then participants should become more capable of acting outside of the influences of internal states. In the relaxation group, high self-esteem participants may not feel the need to engage in a seemingly meaningless (letter circling) task because they already feel good and do not need to

waste energy boosting self-worth, whereas depressed participants may see the task as an opportunity to perform well (boosting their self-worth), thus choosing to dedicate more energy to the task. Past research has demonstrated a positive correlation between depression and self-worth that is contingent on external feedback. Burwell and Shirk (2006) found that in adolescents, self-worth with a greater reliance on external feedback and success in any of four domains (social, academic, activities and appearance) was linked to greater likelihood of depressive symptoms over time (i.e. depressed individuals are more likely to possess self-worth that is contingent on external feedback or success than non-depressed individuals). Therefore, higher BDI scores should result in greater energy expenditure in an attempt to gain social approval and success. However, if mindfulness participants have gained an increased ability to act with awareness while not reacting to inner experience, then it follows that their internal states (i.e. depression) should exert less influence on their behavior. Overall, the results of Study 2 support the conclusions of Study 1, while also providing further validity for the mindfulness exercise.

## General Discussion

### *Future Research*

The present research presents a new application of mindfulness within the framework of terror management theory. The cultivation of mindfulness may provide a means of alleviating detrimental MS effects. However, some issues exist that could be addressed in future research.

Given that TMT posits that MS effects such as materialism and worldview defense are consequent to death-thought suppression resulting from existential anxiety, it should follow that simple states of relaxation should elicit a diminished death-thought suppression response, just as mindfulness was hypothesized to do. Both Studies 1 and 2 implemented a relaxation exercise as

a control for the mindfulness exercise. This was done in an attempt to distinguish the effects of mindfulness from the effects of simple parasympathetic PNS activation (physiological relaxation) on anxiety responses in general, which presumably includes existential anxiety. Future research might use physiological measurements such as skin conductance or heart rate to provide a more accurate means of comparing the relative parasympathetic activation capacities of both the mindfulness and relaxation exercises. Until those measurements can be made, it is still possible that the effects of the mindfulness exercise in Study 1 were due to the mindfulness exercise causing more relaxation than the relaxation exercise, rather than causing more mindfulness.

Although in this study a short period of mindfulness resulted in promising MS effects, the likelihood of such a manipulation working in the face of daily death reminders seems low. Additional work might investigate the appropriate lengths of mindfulness practice, the efficacy of mindfulness exercises of extended durations, i.e. various periods of weeks, to provide an idea of an optimal time-frame for practice. That would more closely follow in the clinical mindfulness tradition, where mindfulness exercises are practiced daily for many weeks. Similarly, different types of mindfulness exercises could be compared in efficacy in regards to diminishment of MS effects.

### *Conclusion*

As our world becomes increasingly globalized, tolerance of worldviews different than one's own becomes increasingly important in maintaining harmonious human interactions. Likewise, as the finite natural resources of the Earth become increasingly scarce, responsible and frugal consumer behavior becomes increasingly important. Unfortunately, TMT research has

demonstrated that both one's tolerance of alternative worldviews and one's responsible consumer behavior are jeopardized as a function of MS-induced anxiety (materialism: Routledge, Arndt, & Goldenberg, 2004; Kasser & Sheldon, 2000; worldview defense: Arndt, Greenberg, Pyszczynski & Solomon, 1997). And because death cannot be avoided, it follows that techniques that result in a diminished defensive response to MS will become more necessary to society as time progresses. Techniques based on the cultivation of mindfulness seem to provide an option accessible to all socioeconomic groups. The findings of Study 1 suggest that mindfulness exercises possess the potential to quickly alleviate death-thought suppression, which suggests less fear of death. By diminishing fear of death, individuals will be less likely to engage in defensive strategies such as materialistic behavior and worldview defense. This work adds to findings showing beneficial effects of mindfulness on various outcome measures. For instance, mindfulness has been shown to negatively correlate with a number of undesirable psychological states (neuroticism, alexithymia, dissociation, experiential avoidance) and positively correlate with a number of desirable psychological states (openness to experience, emotional intelligence, self-compassion; Baer et al. 2006). If future research further indicates that mindfulness exercises effectively ameliorate undesirable MS effects, then the problems that they cause, both socially and interpersonally, will pose less of a threat to the future of human existence.

## References

- Aiken, L. S., & West, S. G. (1991). *Multiple regression: Testing and interpreting interactions*. Newbury Park, CA: Sage.
- Arndt, J., Greenberg, J., Pyszczynski, T., & Solomon, S. (1997). Subliminal exposure to death related stimuli increases defense of the cultural worldview. *Psychological Science*, 8(5), 379-385.
- Arndt, J., Greenberg, J., Solomon, S., Pyszczynski, T., & Simon, L. (1997). Suppression, accessibility of death-related thoughts, and cultural worldview defense: Exploring the psychodynamics of terror management. *Journal of Personality and Social Psychology*, 73(1), 5-18.
- Baer, R. A., Krietmeyer, J. (2006). Overview of mindfulness- and acceptance-based treatment approaches. In R. A. Baer (Ed.), *Mindfulness-Based Treatment Approaches*, pp. 3-27, Academic Press, San Diego, CA.
- Baer, R.A., Smith, G.T., Hopkins, J., Krietemeyer, J., & Toney, L. (2006). Using self-report assessment methods to explore facets of mindfulness. *Assessment*, 13(1), 27-45.
- Beck, A.T., Ward, C., & Mendelson, M. (1961). Beck depression inventory (BDI). *Archive of General Psychiatry*, 4, 561-571.
- Brown, K.W., & Ryan, R.M. (2003). The benefits of being present: Mindfulness and its role in psychological well-being. *Journal of Personality and Social Psychology*, 84(4), 822-848.
- Burroughs, J.E., & Rindfleisch, A. (2002). Materialism and well-being: A conflicting values perspective. *Journal of Consumer Research*, 29(3), 348-370.
- Burwell, R.A., & Shirk, S.R. (2006). Self-processes in adolescent depression: the role of self worth contingencies. *Journal of Research on Adolescence*, 16(3), 479-490.

- Carlson, L.E., & Garland, S.N. (2005). Impact of mindfulness-based stress reduction (MBSR) on sleep, mood, stress and fatigue symptoms in cancer outpatients. *International Journal of Behavioral Medicine*, 12(4), 278-285.
- Carlson, L.E., Speca, M., Patel, K.D., & Goodey, E. (2004). Mindfulness-based stress reduction in relation to quality of life, mood, symptoms of stress and levels of cortisol, dehydroepiandrosterone sulfate (DHEAS) and melatonin in breast and prostate cancer outpatients. *Psychoneuroendocrinology*, 29(4), 448-474.
- Carson, J.W. (2003). Mindfulness meditation-based treatment for relationship enhancement. *Dissertation Abstracts International: Section B: The Sciences and Engineering*, 63(8-B), 3906.
- Chang, L.; Arkin, Robert M. (2002). Materialism as an attempt to cope with uncertainty. *Psychology & Marketing*, 19(5), 389-406.
- Fein, S. & Spencer, S.J. (1997). Prejudice as self-image maintenance: Affirming the self through derogating others. *Journal of Personality and Social Psychology*, 73(1), 31-44.
- Galliot, M.T., Schmeichel, B.J., & Baumeister, R.F. (2006). Self-regulatory processes defend against the threat of death: effects of self-control depletion and trait self-control on thoughts and fears of dying. *Journal of Personality and Social Psychology*, 91(1), 49-62.
- Greenberg, J., Pyszczynski, T., Solomon, S., Simon, L., & Breus, M. (1994). Role of consciousness and accessibility of death-related thoughts in mortality salience effects. *Journal of Personality and Social Psychology*, 67(4), 627-637.
- Harding, S.R., Flannelly, K.J., Weaver, A.J., & Costa, K.G. (2005). The influence of religion on death anxiety and acceptance. *Mental Health, Religion & Culture*, 8(4), 253-261.
- Harmon-Jones, E., Simon, L., Greenberg, J., Pyszczynski, T., Solomon, S., & McGregor, H.

- (1997). Terror management theory and self-esteem: does self-esteem attenuate or intensify mortality salience effects. *Journal of Personality and Social Psychology*, 72, 24-36.
- Kasser, T., & Sheldon, K. M. (2000). Of wealth and death: Materialism, mortality salience, and consumption behavior. *Psychological Science*, 11, 348–351.
- Landau, M. J.; Goldenberg, J.L.; Greenberg, J.; Gillath, O.; Solomon, S.; Cox, C.; Martens, A.; & Pyszczynski, T. (2006). The siren's call: terror management and the threat of men's sexual attraction to women. *Journal of Personality and Social Psychology*, 90(1), 129-146.
- Muraven, M., Tice, D.M., & Baumeister, R. (1998). Self-control as a limited resource: regulatory depletion patterns. *Journal of Personality and Social Psychology*, 74(3), 774-789.
- Pyszczynski, T., Greenberg, J., Solomon, S., Arndt, J., & Schimel, J. (2004). Why do people need self-esteem? A Theoretical and Empirical Review. *Psychological Bulletin*. 130(3), 435-468.
- Rosenberg, M. (1989). *Society and the Adolescent Self-Image*. Revised edition. Middletown, CT: Wesleyan University Press.
- Routledge, C., Arndt, J., & Goldenberg, J. L. (2004). A time to tan: Proximal and distal effects of mortality salience on sun exposure intentions. *Personality and Social Psychology Bulletin*, 30(10), 1347-1358.
- Schmeichel, B. (2006). Ego Depletion, working memory, and the executive function of the self. *Dissertation Abstracts International: Section B: The Sciences and Engineering*, 66(11-B), 6338.
- Tacon, A.M., Caldera, Y.M., & Ronaghan, C. (2004). Mindfulness-based stress reduction in



women with breast cancer. *Families, Systems & Health*, 22(2), 193-203.

Wall, R.B. (2005). Tai Chi and mindfulness-based stress reduction in a Boston public middle school. *Journal of Pediatric Health Care*, 19(4), 230-237.

Watson, D., Clark, L.A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology*, 54(6), 1063-1070.

Appendix A: Mindfulness and Relaxation Exercise Text  
(each of the three parts originally appeared on separate pages)

Mindfulness Exercise

**Part 1:** Ask yourself, “What is my experience right now?” Notice any bodily sensations, thoughts, and/or emotions that are present. Do not judge them as good or bad, but accept all the good and bad without judgment.

*Continue paying attention to your body and thoughts in a nonjudgmental manner until the experimenter asks you to turn the page.*

**Part 2:** Now, focus your full attention and awareness on the movements and sensations of breathing. Notice each in-breath and out-breath as it occurs. If any thoughts come up, briefly acknowledge them, then gently return your attention to the breathing. Accept all good and bad thoughts equally.

*Continue paying attention to your body and thoughts in a nonjudgmental manner until the experimenter asks you to turn the page.*

**Part 3:** Now, expand your awareness to your body as a whole, including posture and facial expressions. Notice the sensations that are present, again with pure, nonjudgmental acceptance. Accept the good and the bad equally.

*Continue paying attention to your body and thoughts in a nonjudgmental manner until the experimenter asks you to turn the page.*

Relaxation Exercise

**Part 1:** Uncross your legs with your feet flat on the floor. Sit with your back straight, but not tense. Focus on your breathing; the way the air moves in and out of your body. Focus on your toes. When you breathe in, imagine the air flowing into your toes. Next, do the same with your feet, then calves, then thighs.

*Continue doing this until the experimenter asks you to turn the page.*

**Part 2:** While maintaining a straight, comfortable posture, continue to imagine your breath entering your hands, arms, chest, and abdomen.

*Continue doing this until the experimenter asks you to turn the page.*

**Part 3:** While maintaining a straight, comfortable posture, continue to imagine your breath entering your neck, mouth, jaw, forehead, and head.

*Continue doing this until the experimenter asks you to turn the page.*

Appendix B: Mortality Salience and Pain Salience Inductions

*Mortality Salience Induction*

Please briefly describe the emotions that the thought of your own death arouses in you.

---

---

---

---

Not down, as specifically as you can, what you think will happen to you physically as you die and once you are physically dead.

---

---

---

---

*Pain Salience Induction*

Please briefly describe the emotions that the thought of a dentist removing one of your teeth arouses in you.

---

---

---

---

Not down, as specifically as you can, what you think will happen to you physically as a dentist is removing one of your teeth.

---

---

---

---

Appendix C: Word Completion Task

Please fill in the blanks provided within each word fragment to complete the first word that comes to mind. For example, you might fill in “S\_\_E” as “SALE” or “STALE”. Just be sure to write the first thing that comes to mind, as long as it forms a *real word*. Use *as few or as many* letters as you need to complete the word.

- |             |            |
|-------------|------------|
| 1. HEA__    | 16. P__TCH |
| 2. __PED    | 17. BA__ER |
| 3. GA__E    | 18. W__SH  |
| 4. FL__R    | 19. SK__LL |
| 5. THR__    | 20. TIL__  |
| 6. __ILLED  | 21. ME__T  |
| 7. SPR__G   | 22. GRA__E |
| 8. TRA__E   | 23. TRI__  |
| 9. W__D     | 24. BAN__A |
| 10. BUR__ED | 25. PL__K  |
| 11. __UNK   | 26. __LD   |
| 12. DEA__   | 27. M__DER |
| 13. WA__ER  | 28. WIN__  |
| 14. COFF__  | 29. ST__FF |
| 15. LO__    | 30. H__L   |

Appendix D: Mindfulness Questionnaire

(In the packets, each statement was followed by a table providing answer choices 1 – 5, with 1 = *Almost Never True*, and 5 = *Almost Always True*.)

Listed below are a series of statements that may or may not be true for you. For each statement, circle the answer that best fits how you feel about yourself.

1. I perceive my feelings and emotions without having to react to them.
2. I pay attention to sensations, such as the wind in my hair or sun on my face.
3. I find it difficult to stay focused on what's happening in the present.
4. I'm good at finding the words to describe what I'm feeling.
5. I believe some of my thoughts are abnormal or bad and I shouldn't think that way.
6. I pay attention to sounds, such as clocks ticking, birds chirping, or cars passing.
7. It seems I am "running on automatic" without much awareness of what I'm doing.
8. I can easily put my beliefs, opinions, and expectations into words.
9. I make judgments about whether my thoughts are good or bad.
10. I watch my feelings without getting lost in them.
11. I rush through activities without being really attentive to them.
12. It's hard for me to find words to describe what I am thinking.
13. I tell myself I shouldn't be thinking the way I'm thinking.
14. When I have distressing thoughts or images, I am able just to notice them without reacting.
15. I notice the smells and aromas of things.
16. I have trouble thinking of the right words to express how I feel about things.
17. I think some of my emotions are bad or inappropriate and I shouldn't feel them.
18. When I have distressing thoughts or images, I "step back" and am aware of the thought or image without getting taken over by it.
19. I notice visual elements in art or nature, such as colors, shapes, textures, or patterns of light and shadow.
20. I find myself doing things without paying attention.

Appendix E: Rosenberg Self-Esteem Scale

(In the packets, each statement was followed by a table providing responses 1 – 6, with 1 = *Disagree Very Much*, and 6 = *Agree Very Much*.)

Instructions: We are interested in how the next set of statements describes you. Please rate how characteristic each statement is of you by entering the number from the corresponding scale that best represents your answer.

1. I feel that I am a person of worth, at least on an equal basis with others.
2. I feel that I have a number of good qualities.
3. All in all, I am inclined to feel that I am a failure.
4. I am able to do things as well as most other people.
5. I feel that I do not have much to be proud of.
6. I take a positive attitude toward myself.
7. On the whole, I am satisfied with myself.
8. I wish I could have more respect for myself.
9. I certainly feel useless at times.
10. At times I think that I am no good at all.

### Appendix F: Beck Depression Inventory

Read each item carefully and blacken in the circle next to the answer that best reflects how you have been feeling **during the past two weeks**. If you cannot decide between two responses, fill in the circle next to the response with the highest number.

- A.    ☐ 0 I do not feel sad.  
       ☐ 1 I feel sad.  
       ☐ 2 I am sad all of the time and I can't snap out of it.  
       ☐ 3 I am so sad or unhappy that I can't stand it.
  
- B.    ☐ 0 I am not particularly discouraged about the future.  
       ☐ 1 I feel discouraged about the future.  
       ☐ 2 I feel I have nothing to look forward to.  
       ☐ 3 I feel that the future is hopeless and that things cannot improve.
  
- C.    ☐ 0 I do not feel like a failure.  
       ☐ 1 I feel I have failed more than the average person.  
       ☐ 2 As I look back on my life, all I can see is a lot of failures.  
       ☐ 3 I feel I am a complete failure as a person.
  
- D.    ☐ 0 I get as much satisfaction out of things as I used to.  
       ☐ 1 I don't enjoy things the way I used to.  
       ☐ 2 I don't get real satisfaction out of anything anymore.  
       ☐ 3 I am dissatisfied or bored with everything.
  
- E.    ☐ 0 I don't feel particularly guilty.  
       ☐ 1 I feel guilty a good part of the time.  
       ☐ 2 I feel quite guilty most of the time.  
       ☐ 3 I feel guilty all of the time.
  
- F.    ☐ 0 I don't feel I am being punished.  
       ☐ 1 I feel I may be punished.  
       ☐ 2 I expect to be punished.  
       ☐ 3 I feel I am being punished.
  
- G.    ☐ 0 I don't feel disappointed in myself.  
       ☐ 1 I am disappointed in myself.  
       ☐ 2 I am disgusted with myself.  
       ☐ 3 I hate myself.
  
- H.    ☐ 0 I don't feel I am any worse than anybody else.  
       ☐ 1 I am critical of myself for my weaknesses or mistakes.  
       ☐ 2 I blame myself all the time for my faults.  
       ☐ 3 I blame myself for everything bad that happens.
  
- I.    ☐ 0 I don't have any thoughts of killing myself.  
       ☐ 1 I have thoughts of killing myself, but I would not carry them out.  
       ☐ 2 I would like to kill myself.  
       ☐ 3 I would kill myself if I had the chance.
  
- J.    ☐ 0 I don't cry anymore than usual.  
       ☐ 1 I cry more now than I used to.  
       ☐ 2 I cry all the time now.  
       ☐ 3 I used to be able to cry, but now I can't even though I want to.
  
- K.    ☐ 0 I am no more irritated now than I ever am.  
       ☐ 1 I get annoyed or irritated more easily than I used to.  
       ☐ 2 I feel irritated all the time now.  
       ☐ 3 I don't get irritated at all by the things that used to irritate me.

- L.    ☐ 0 I have not lost interest in other people.  
       ☐ 1 I am less interested in other people than I used to be.  
       ☐ 2 I have lost most of my interest in other people.  
       ☐ 3 I have lost all of my interest in other people.
- M.    ☐ 0 I make decisions about as well as I ever could.  
       ☐ 1 I put off making decisions more than I used to.  
       ☐ 2 I have greater difficulty in making decisions than before.  
       ☐ 3 I can't make decisions at all anymore.
- N.    ☐ 0 I don't feel I look any worse than I used to.  
       ☐ 1 I am worried that I am looking old or unattractive.  
       ☐ 2 I feel that there are permanent changes in my appearance that make me look unattractive.  
       ☐ 3 I believe that I look ugly.
- O.    ☐ 0 I can work about as well as before.  
       ☐ 1 It takes an extra effort to get started at doing something.  
       ☐ 2 I have to push myself very hard to do anything.  
       ☐ 3 I can't do any work at all.
- P.    ☐ 0 I can sleep as well as usual.  
       ☐ 1 I don't sleep as well as I used to.  
       ☐ 2 I wake up 1-2 hours earlier than usual and find it hard to get back to sleep.  
       ☐ 3 I wake up several hours earlier than I used to and cannot get back to sleep.
- Q.    ☐ 0 I don't get more tired than usual.  
       ☐ 1 I get tired more easily than I used to.  
       ☐ 2 I get tired from doing almost anything.  
       ☐ 3 I am too tired to do anything.
- R.    ☐ 0 My appetite is no worse than usual.  
       ☐ 1 My appetite is not so good as it used to be.  
       ☐ 2 My appetite is much worse now.  
       ☐ 3 I have no appetite at all anymore.
- S.    ☐ 0 I am purposely trying to lose weight by eating less **OR** I haven't lost much weight, if any, lately.  
       ☐ 1 I have lost more than 5 pounds, but I am not purposely trying to lose weight.  
       ☐ 2 I have lost more than 10 pounds, but I am not purposely trying to lose weight.  
       ☐ 3 I have lost more than 15 pounds, but I am not purposely trying to lose weight.
- T.    ☐ 0 I am no more worried about my health than usual.  
       ☐ 1 I am worried about physical problems such as aches and pains; or upset stomach, or constipation.  
       ☐ 2 I am very worried about physical problems, and it's hard to think of much else.  
       ☐ 3 I am so worried about my physical problems that I cannot think about anything else.
- U.    ☐ 0 I have not noticed any recent change in my interest in sex.  
       ☐ 1 I am less interested in sex than I used to be.  
       ☐ 2 I am much less interested in sex now.  
       ☐ 3 I have lost interest in sex completely.